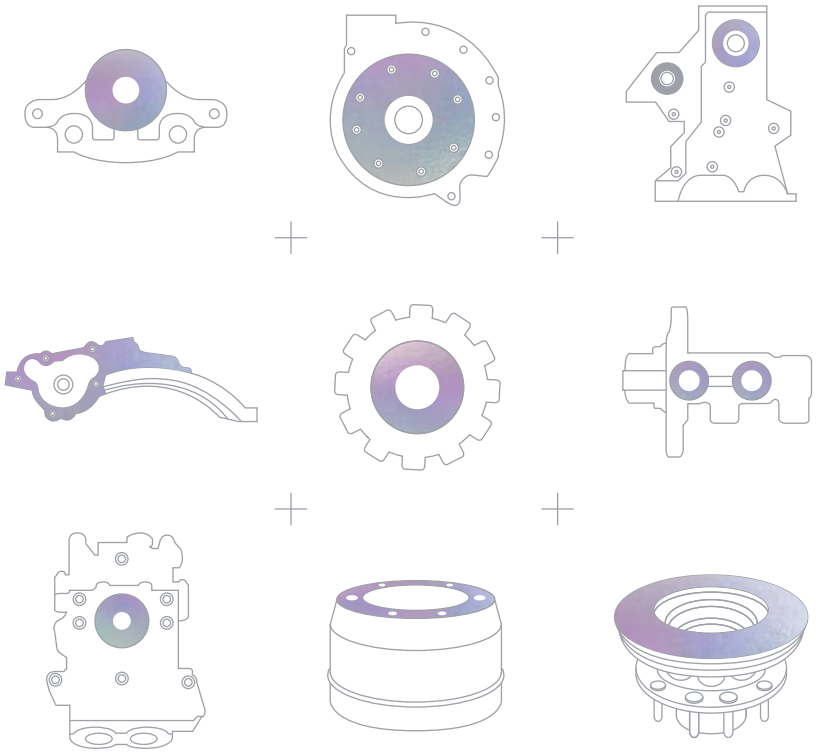
SEMYUNG TECH
Chassis & Powertrain

MAKING YOUR CAR LIGHTER FOR THE GREEN FUTURE

SEMYUNG TECH

Leads automobile industry
World's Best competitiveness

www.semyungtech.com



LEADS AUTOMOBILE INDUSTRY WORLD'S BEST COMPETITIVENESS

semyungtech

PASSION
Setting goals to achieve.
Immediately, run to the end.
challenge.

HARMONY
Respect for human life
and care.
Motivation.

GLOBAL
Advanced technology,
culture, Embrace and
sublimation.

CREATIVE
Aiming for innovation.
Endless curiosity.
Constant improvement.

ABOUT SEMYUNG TECH

Since founded in 1994, we continue to make an effort to achieve 'the #1 light weight automotive parts company in the world till year 2020' and consistently focus on maximizing customer's benefit and satisfaction. In order to provide best quality and lowest cost parts, we have been developing variety of aluminum casting and forging technologies that improve fuel econimy and vehicle performance.

We operate in three divisions: The Chassis division produces aluminum light weight suspension parts. The die casting division produces engine and transmission aluminum components. The commercial vehicle division produces brake hub and disc/drum assembly.

Semyungtech focus on developing innovative aluminum parts manufacturing technologies in order to meet higher level of quality and lower cost requirements in the future. We always purse a goal "Beyond customer's expectation."

People are the most important asset of our company and also source of our future. By providing higher level of education for all staffs, we continue to improve people's ability on order to achieve personal goal as well as to raise company's international competitiveness.

HISTORY

1994 Semyungtech is established
1995 Iksan plant begins production of commercial vehicle's brake hub and drum assembly
2000 Iksan aluminum die casting plant begins production of passenger car engine components
2004 ISO 16949 certified
2005 Is appointed as an 'Excellent strategic company' by provincial government
Asan plant begins production of aluminum Chassis components (COBA Press)
2006 ISO 14001 certified
2008 Engineering center is established
'Component/Material Specialist' certified by Government INNO-BIZ certified
2009 Is appointed as a 'Leading company' by provincial government
2011 Iksan aluminum die casting plant#2 begins production
2012 Is appointed as a ' Hidden Champion' by Korea Export & Import bank
2014 Certified NET [New Exellent Technology]
2015 Built the Iksan second factory
2017 Built the Mexico factory

MAIN CLIENT

HYUNDAI
HYUNDAI WIA TURBO
HYUNDAI MOBIS
HYUNDAI WIA
HYUNDAI DYMOS
myunghwa
Innovation in Motion TSUBAKI

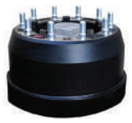
CERTIFICATIONS

ISO/TS 16949 | ISO 14001 | OHSAS 18001 | Environmental management system | Quality management system cert

Jeollabuk excellent strategic company | Confirmation of parts and mate | INNO-BIZ | Minister of Knowledge Economy | Confirmation of parts Taxation citat

BUSINESS AREA

BRAKE PART



- Disc Brake Assembly
- Drum Brake Assembly

ENGINE PART

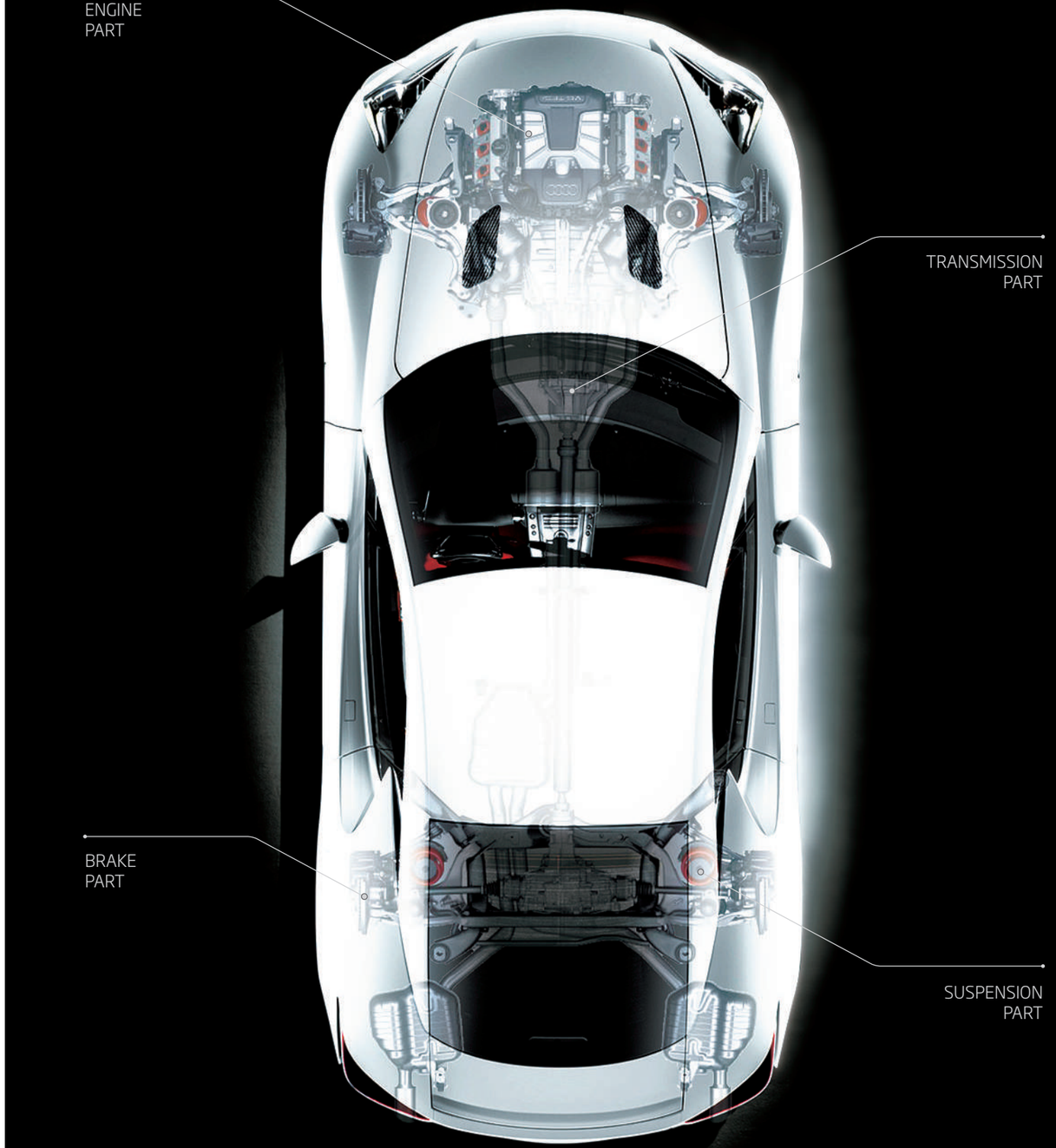
- Timing Chain Cover
- Oil Pump
- Turbo Charger Comp Housing
- Water Pump

TRANSMISSION PART

- Oil Pump Cover
- Drum Support

SUSPENSION PART

- Aluminum Knuckle
- Aluminum Carrier



– BRAKE-HUB & DRUM / DISC ASSEMBLY

BRAKE PART

DRUM BRAKE ASSEMBLY

CUSTOMER	HYUNDAI, HYUNDAI MOBIS
APPLICATION	Truck & Bus
MATERIAL	FC25
TYPE	Drum Type

DRUM BRAKE ASSEMBLY

CUSTOMER	HYUNDAI, HYUNDAI MOBIS
APPLICATION	Truck & Bus
MATERIAL	FC25
TYPE	Drum Type

DRUM BRAKE ASSEMBLY

CUSTOMER	HYUNDAI, HYUNDAI MOBIS
APPLICATION	Truck & Bus
MATERIAL	FC25
TYPE	Drum Type

DISC BRAKE ASSEMBLY

CUSTOMER	HYUNDAI, HYUNDAI MOBIS
APPLICATION	Truck & Bus
MATERIAL	FC21+ α
TYPE	Disc Type

SPLINED DISC BRAKE ASSEMBLY

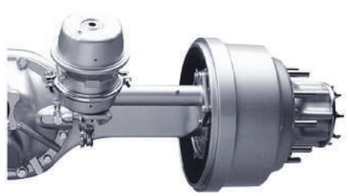
CUSTOMER	HYUNDAI, HYUNDAI MOBIS
APPLICATION	Truck & Bus
MATERIAL	FC21+ α
TYPE	Splined Disc Type

DRUM + HUB = DRUM TYPE

DISC +HUB = DISC TYPE

– BRAKE SYSTEM BRAKE-HUB&DRUM / DISC ASSEMBLY

BRAKE PART



DRUM TYPE

DISC TYPE

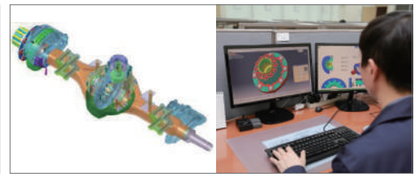
HUB&DRUM/DISC QUALIFICATION

NOISE & JUDDER ⌄ | ABRASION RESISTANCE ⌃ | THERMAL ENDURANCE ⌃

RESEARCH DEVELOPMENT PROCESS

DESIGN & BENCH MARKING
(OPTIMUM DESIGN)

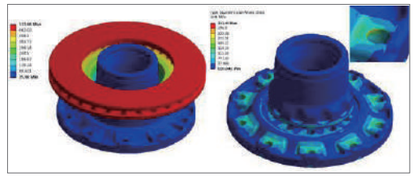
Needs analysis



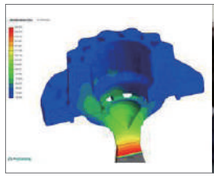
Optimum Design

OPTIMUM DESIGN
- Performance
- Material
- Method
- Cost

CAE ANALSYS

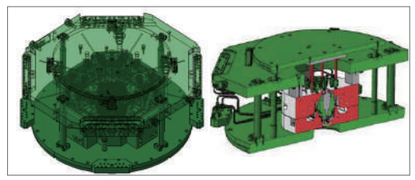


Cae Analysys
- Thermal Deformation Analysis
- Structural Analysis

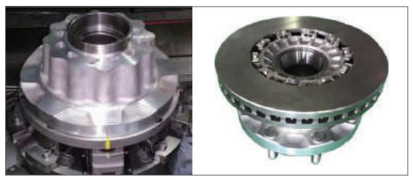


Casting Simulation
- Forecasts inner defect results in optimum design and best casting method

PRODUCTION
(MOLD, JIG, PART)

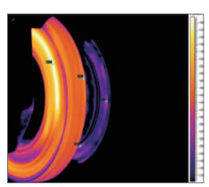


Mold, jig Development

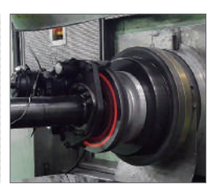


Part Production

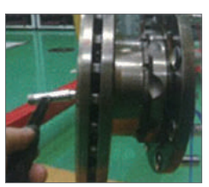
VALIDATION
(BRAKE ASSY PERFORMANCE)



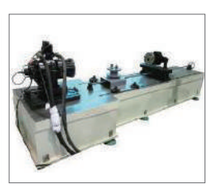
Heat Crack



Dynamo



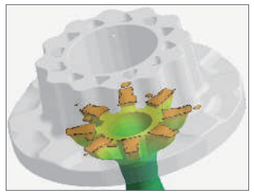
Vibration characteristic



Strength test

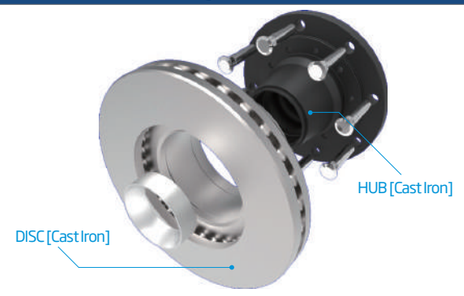
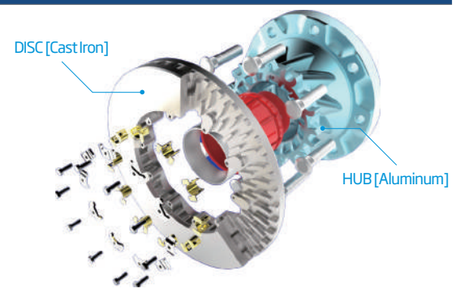
BRAKE-HYBRID DISC ASSEMBLY

LIGHTWEIGHT 30%

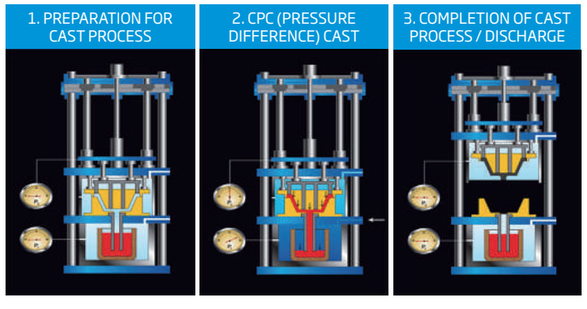


[Casting Interpretation]

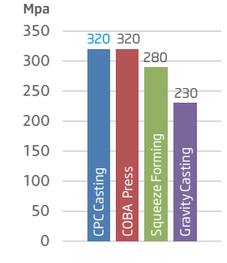
- Applied high strength light weight aluminum that substitutes the existing cast iron material (A356)
- Applied NET CPC interpretation / casting technology and secured tensile strength of aluminum material
  - Equal or higher quality of property of matter than casting / forging is verified by the 2.5bar of Squeeze casting effect

CLASSIFICATION	Existing DISC BRAKE	HYBRID DISC
Photos		
DISC	26.0kg	17.55kg
HUB	16.72kg	12.38kg
Others	BOLTS 0.55kg	BOLT and SPRING 0.14kg
Total	43.72kg	30.07kg (↓ 13.2kg)

CPC CATING



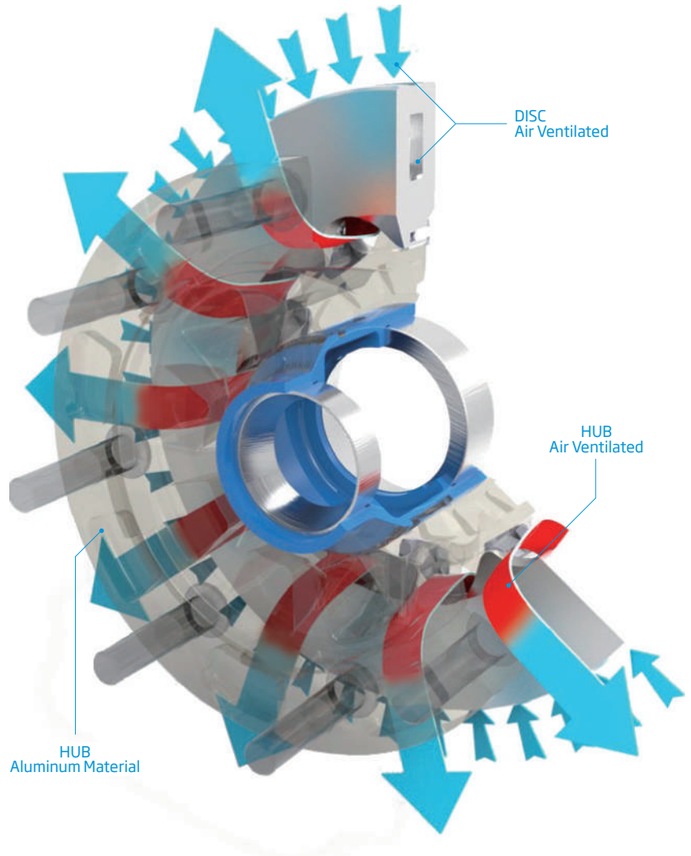
[CPC Casting Flow]



[Tensile Strength]

OPTIMUM COOLING DESIGN

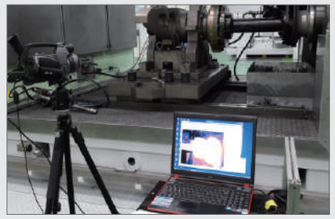
- Optimized design for Disk Ventilation
- Optimized design for cooling function
- Disc to maintain the endurance of Axle Bearing
  - Heat transfer to Hub is minimized (Prevents grease deterioration)
- Applied high strength aluminum material that is effective for cooling
  - AL 240W/mk : ST 80W/mk



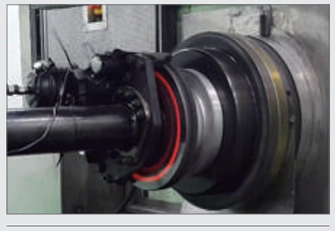
[Cooling circulation layout]

CLASSIFICATION	Existing DISC BRAKE	HYBRID DISC
Max	540°C	500°C
Min	400°C	320°C
Others	Measured temperature after the frictional force is stabled	

[Measure the braking temperature by each of the specification]



[Braking Temperature Test]



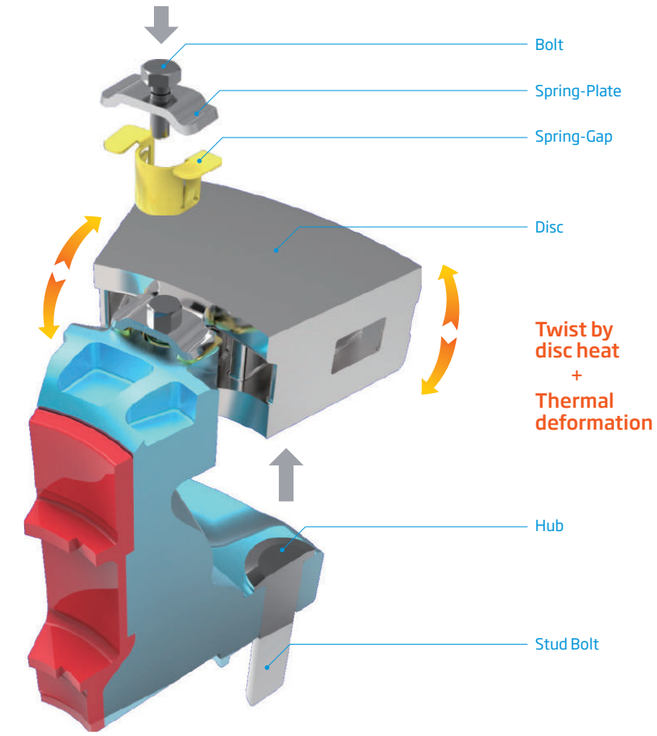
[Heat Crack Test]

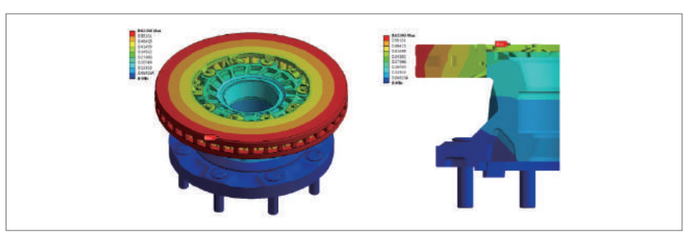
[Temperature measurement]

BRAKE-HYBRID DISC ASSEMBLY

OPTIMUM FREE MTG DESIGN

- Applied degree of disk deformation freedom for the braking heat
  - Optimized Interpretation / Design
- Improved disk thermal crack preventing performance by releasing the forced restriction
- Better partial inner and outer thermal crack performance than bulk product is verified (generally evaluated)





[Interpretation of Braking power + Thermal deformation]

Seesaw endurance strength test Passed

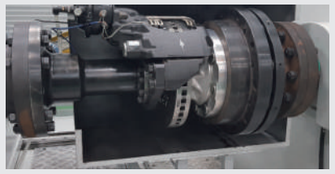
CLASSIFICATION	Deceleration (g)	Number of test	Torque (kgf.m)
BNS	0.35	5,000	449
Test	0.60	300,000	769

[ES Test Standard]

Thermal crack test Passed

Speed (KPH)	Decelration(g)	Braking distance	Number of braking	Remarks
120 → 60	0.15	60	6	2,700times Braking completed

[ES Test Standard]



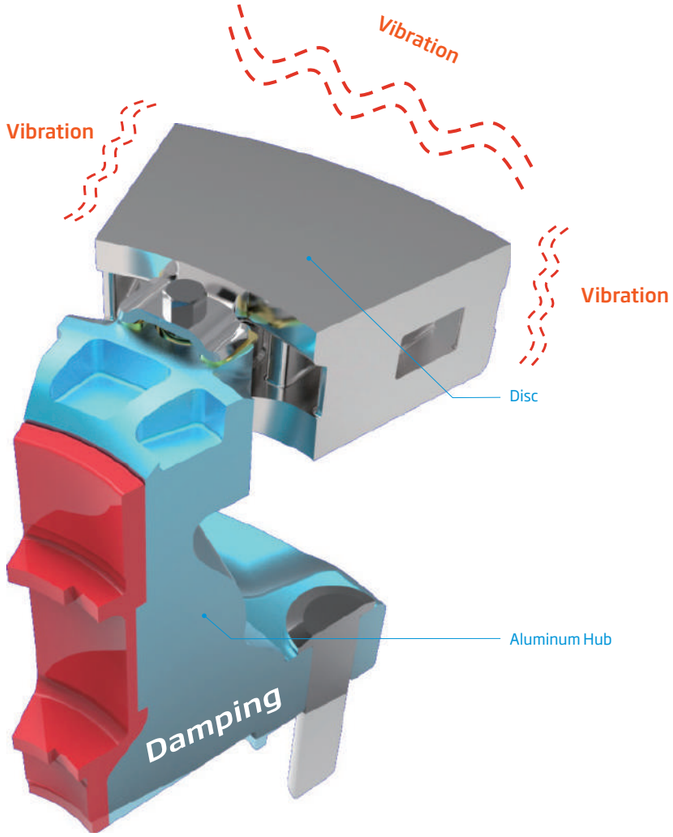
[Seesaw endurance strength, Thermal crack test layout]

[Seesaw endurance strength, Test specimen]

[Thermal crack test specimen]

VIBRATION NOISE REDUCTION

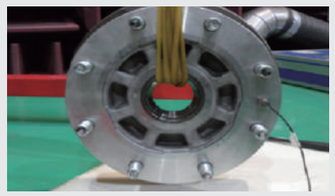
- Structural design to reduce the vibration and noise when braking the disc
- Processing HMC SPEC TEST
  - Supports Free condition
  - Applied acceleration sensor to measure the vibration
  - Measure the excitation and frequency of disc surface using impact hammer (Band : 10kHz, Res : 0.25kHz)
  - Analysis of damping ration by each of frequency depending on the natural frequency and verification of damping time depending on the excitation
- 250% of vibration and noise reduced comparing to the bulk product



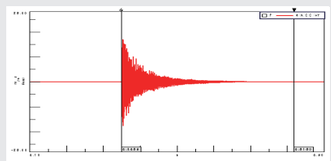
CLASSIFICATION	Damping time (sec)	Remarks
Bulk	0.4691	250% ↑ Reduced
Suggested	0.1734	

[HMC SPEC TEST RESULT]

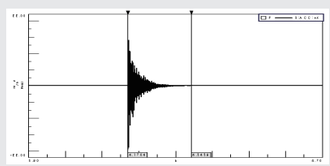
[Bulk product]



[Suggested product]



[Damping time graph, Bulk product]



[Damping time graph, Suggested product]

HIGH PRESSURE DIE CASTING

ENGINE PART

TIMING CHAIN COVER

CUSTOMER HYUNDAI, KIA
VEHICLE GAMMA Engine

TIMING CHAIN COVER

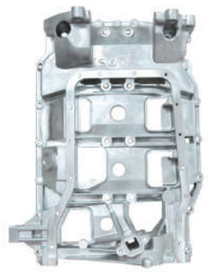
CUSTOMER HYUNDAI, KIA
VEHICLE NU Engine

TIMING CHAIN COVER

CUSTOMER HYUNDAI, KIA
VEHICLE KAPPA Engine

BALANCE SHAFT MODULE

CUSTOMER HYUNDAI, KIA
VEHICLE THETA Engine



OIL PUMP HOUSING

CUSTOMER HYUNDAI, KIA
VEHICLE A2 Engine

WATER PUMP BODY

CUSTOMER CHRYSLER
VEHICLE HEMI Engine

TRANSMISSION PART

OIL PUMP COVER

CUSTOMER HYUNDAI, KIA
VEHICLE THETA Engine

DRUM SUPPORT

CUSTOMER HYUNDAI, KIA
VEHICLE Automatic transmission

TENSION LEVER

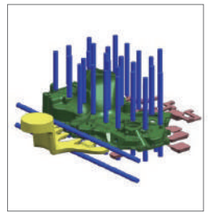
CUSTOMER TSUBAKI MOTOR
VEHICLE LAMBDA ENGINE

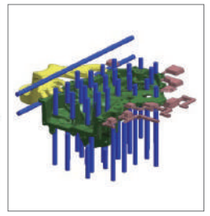
ALUMINUM HPDC

Apply various casting complex technology to overcome the limitation of general die casting

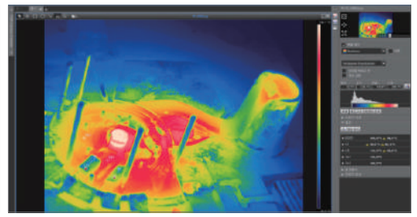
CASTING SIMULATION

Assures product's preceding quality by the casting and forging simulation

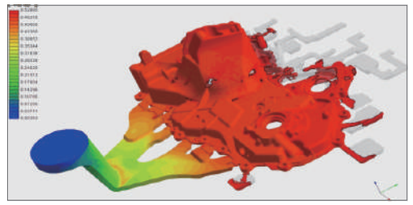




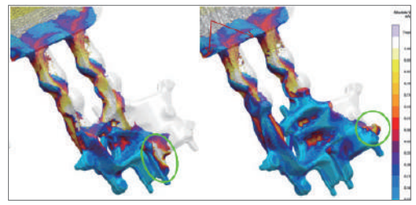
Design



Thermal analysis
- Mold temperature analysis by using a thermal camera



HP Die casting

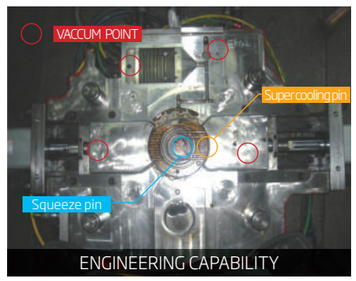


Gravity casting

MANUFACTURING TECHNOLOGY FOR DIE CASTING

Imposes multi die casting equipments to improve quality and technique

MULTI-HIGH PRESSURE DIE CASTING



GENERAL DIE CASTING

- VACUUM
- VACCUM COOLING
- SUPER COOLING
- PARTIAL SQUEEZE
- SHOT SLEEVE AIRVENT SYSTEM

– CASTING

ENGINE PART

TURBO CHARGER C/H

CUSTOMER HWT
VEHICLE GAMMA(200PS)

TURBO CHARGER C/H

CUSTOMER HWT
VEHICLE NU Engine

TURBO CHARGER C/H

CUSTOMER HWT
VEHICLE GAMMA(180PS)

CENTER HSG COVER (TURBO CHARGER)

CUSTOMER HYUNDAI-WIA
VEHICLE KAPPA, R Engine

SEAL PALTE (TURBO CHARGER)

CUSTOMER HWT
VEHICLE GAMMA(180PS), NU Engine

– COBA(CASTING+FORGING)

SUSPENSION PART

RR CARRIER

CUSTOMER HYUNDAI, KIA
VEHICLE SONATA, GRANDEUR, K5, K7

RR CARRIER

CUSTOMER HYUNDAI, KIA
VEHICLE EQUUS, GENESIS, K9

FR KNUCKLE

CUSTOMER HYUNDAI, KIA
VEHICLE EQUUS, GENESIS, K9

COBA PRESS [GRAVITY CASTING & FORGING]

MANUFACTURING TECHNOLOGY FOR COBA PRESS

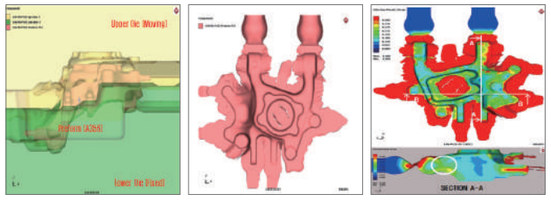
Multi-manufacturing method using casting and forging process(COBA Press) is innovated mass manufacturing method for aluminum chassis components introduced by Saint jean Inc in 2006

* Main characteristics: Remove casting defects and improve the fatique resistance by forging and heat-treating the performed (near net shape) casting after pre-heating

PROCESS FLOW

Melting G.B.F Gravity casting Pre-heating Forging Trimming T-6heat treatment Fluorescent penetrant inspection

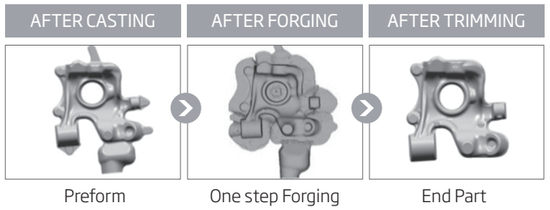
FORGING SIMULATION



APPLICATION

- KNUCKLE
- CARRIER
- CONTROL ARM ,,,etc

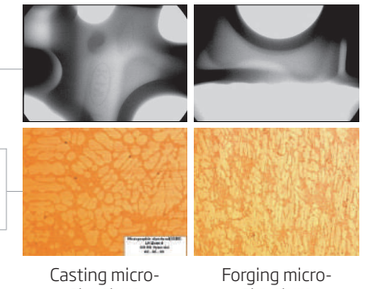
DESIGN PROCESS



Preform One step Forging End Part

ADVANTAGES

- CASTING DEFECTS ZERO
- IMPROVEMENT OF THE FATIQUE RESISTANCE (FORGING STRUCTURE ON SURFACE)
- IMPROVEMENT OF MECHANICAL PROPERTY



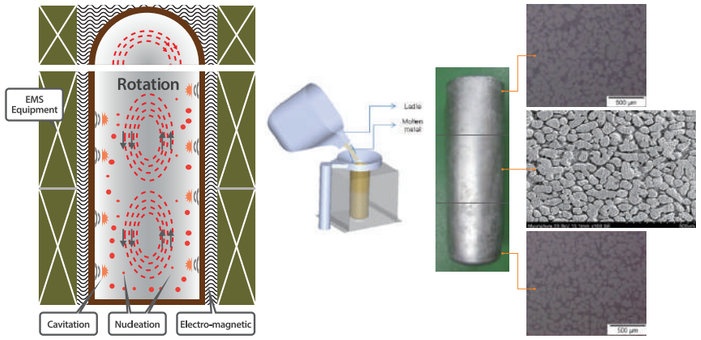
Casting micro-structure Forging micro-structure

SEMI-SOLID HIGH PRESSURE CASTING

SEMI-SOLID DIE CASTING

It is a high pressure squeeze casting method by injecting feeding materials in a phase of semi-solid, not in a liquid phase, in a casting process. It realizes minimizing internal casting defects caused by spheroidizing metallic structure through its process. It sharply increases mechanical properties such as tensile strength and elongation.

H-NCM METHOD - EMS SEMI-SOLID NUCLEATION TECHNIQUE



CAVITATIONS EFFECT

causes molten metal explosion inside with cavitation superposition phenomenon by amplifying its energy. The shorter cavitation has, the more advantageous it is. It has grain refining effect

EMS EQUIPMENT (ELECTRO-MAGNETIC STIRRING)

helps separating dendric structure and uniforming slurry quality

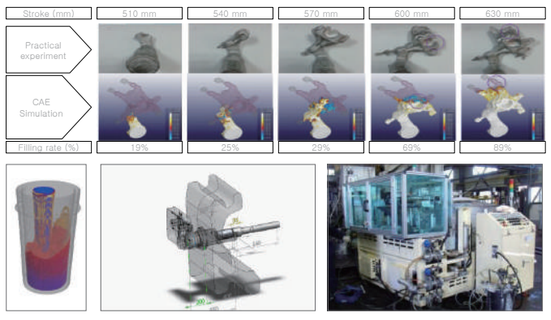
PRODUCTS DEVELOPED

Brake Caliper
Semi-solid HPDC

Master Cylinder and turbo charger comp hsg
Semi-solid HPDC

Rear Carrier
Semi-solid HPDC

CASTING SIMULATION FOR PROCESS ASSURANCE AND DEVELOPMENT



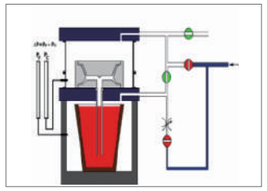
DEVELOPMENT LINE

CPC [LOW PRESSURE CASTING]

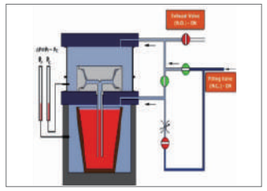
CPC(COUNTER PRESSURE CASTING)

It is laminar filling pattern & directional solidification (Is good for the casting abillity). Productivity and quality is superior compare with general low pressure casting

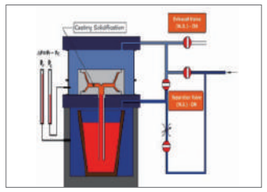
CPC MACHANISM



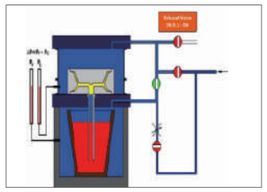
1. Preparation



2. Pressure loading to furnace & chamber



3. Increasing pressure to furnace



4. Solidification

DESCRIPTION OF CPC MACHINE

CPC MACHINE

- CPC machine
- Cooling unit (64channels)
- Chamber(die)
- Cooling tank
- Furnace (900kg/ch)

* PRODUCTION CAPACITY/UNIT/YR : 200,000PCS/YR WITH 4CAVITY

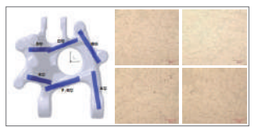
STRONG POINT

1. REDUCED CYCLE TIME

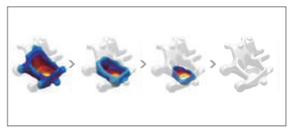
Effect of counter pressure , multi-cooling channel and die design (60% reduction to gravity casting , 10% reduction to lowpressure casting)

2. INCREASING MECHANICAL PROPERTY

Reduced the deviation of mechanical property of each position



DAS microstructure (ave.: 34㎛)



Directional solidification

APPLICATION

PART	CUSTOMER	VEHICLE
AL KNUCKLE	TRW	GM: Impala/Monte Carlo/Buick/Vans
	SMW	GM: Cadillac STS Chrysler: Grand Cherokee Dodge: Durango, Ram Truck
	Honda	Honda: Civic
	VW	Passat, Tiguan
	AUDI	A4, A5, Q5
	BMW	M3
CONTROL ARM	Benz	M-Class, R-Class
	SMW	GM: SUV
SUSPENSION BRACKET	Peugeot	Various Peugeot Models

GLOBAL NETWORK

REPUBLIC OF KOREA

IKSAN PLANT1

- POWERTRAIN PARTS
- ALUMINUM HIGH PRESSURE DIE CASTING
- MACHINING

2016 SALES
US$ 50MIL

IKSAN PLANT2

- TRUCK & BUS BRAKE HUB &DRUM/DISC
- MACHINING &ASSEMBLY

2016 SALES
US$ 30MIL

ASAN PLANT

- ALUMINUM KNUCKLE ALUMINUM CARRIER
- GRAVITY CASTING & FORGING
- LOW PRESSURE CASTING
- MACHINING & ASSEMBLY

2016 SALES
US$ 70MIL

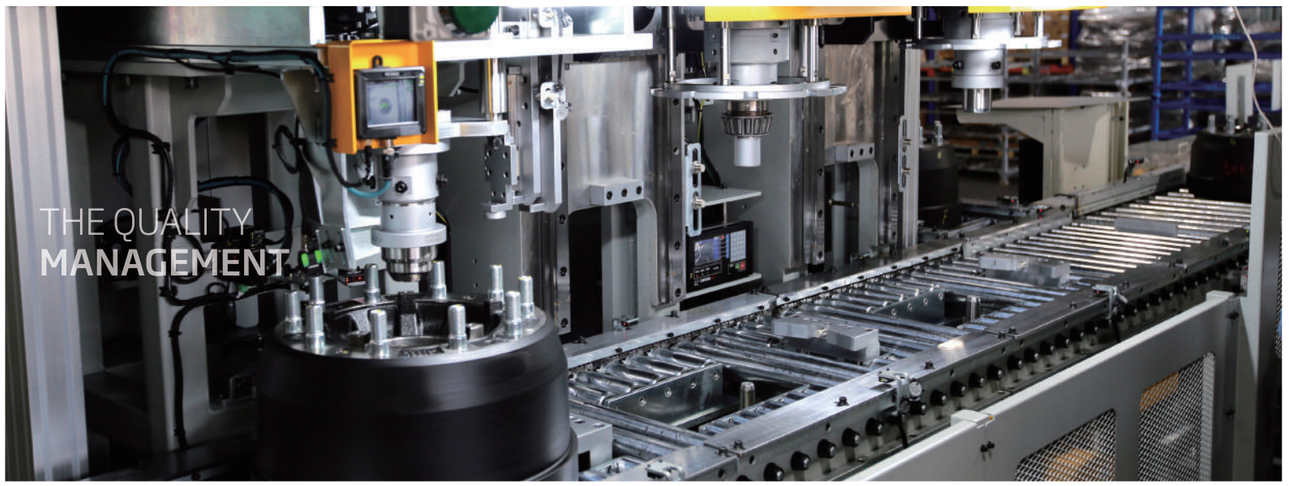
MEXICO

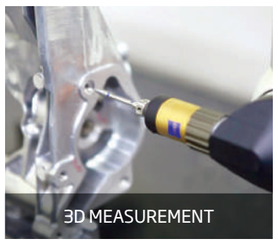
MONTERREY PLANT, MEXICO

- POWERTRAIN PARTS
- ALUMINUM DIE CASTING

OPEN 2017

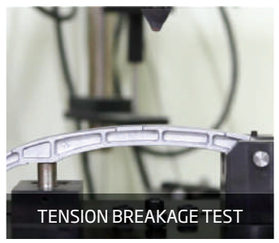
QUALITY ASSURANCE EQUIPMENT




3D MEASUREMENT

X-RAY EXAMINATION

METAL MICROSCOPE


TENSION BREAKAGE TEST

CHEMICAL COMPOSITION ANALYSIS

FIGURE MEASUREMENT

ROUGHNESS MEASUREMENT

HARDNESS MEASUREMENT

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